MD1501

Series Auxiliary Relays

MD1501 series auxiliary relays are mainly used with main protection and control devices. Each relay type is designed with a specific function. Each relay is independent from others with high configurability and extensibility. Relay types are continuously developed in order to meet the requirements of various applications.

Functions

MD1501 series auxiliary relays provide the following functions:

- Trip circuit supervision
- Lockout function
- Tripping relay function
- Repeat relay function (voltage operated or current operated)
- AC voltage switching function

Features

- Various types of relays with dedicated functions are available and can be flexibly combined to meet the requirements of various applications.
- Completely- sealed, high- resistance and low- power consumption relays are adopted. Therefore, power consumption and heat dissipation are greatly reduced and moisture proof is improved.
- The high burden relay for tripping or closing a circuit breaker has strong interference withstanding capabilities.
- More spare relays can be provided and flexibly applied.

Type

MD1501 series auxiliary relays can be classified as the following types according to their function.

Type	Applications
MD1501-551	Trip circuit supervision with current operated auxiliary relay
MD1501-552	Phase segregated trip circuit supervision
MD1501-556	Current operated auxiliary relay (3 elements)
MD1501-561	Bi-stable switching relay
MD1501-571	Electrical reset auxiliary element with internal operating coil supervision (high burden)
MD1501-572	Self reset auxiliary relay with electrical reset LED indicator (high burden)

Technical Data

Power Supply (Voltage Operated Element)

Rated Voltage	110Vdc, 125Vdc, 220Vdc, 250Vdc	
Variation	(80%~120%)Un	
Ripple in the DC auxiliary voltage	Max 15% of the DC value. IEC 60255-11:1979	
Burden	Quiescent condition	< 10W
	Operating condition	< 120W

Mechanical Specifications

Enclosure dimensions (W×H×D)	35.5×173.8×198 (unit: mm)
Trepanning dimensions (W×H)	36.4×154(unit: mm), M3 screw
Ripple in the DC auxiliary voltage	Mounting
Weight per relay	Approx. 1kg
Housing material	Aluminum, steel
Housing color	Silver grey
Location of terminal	Back side
Enclosure Protection IEC60529:1989	
Front side	IP40
Other sides	IP40
Rear side, connection terminals	IP20

Ambient Temperature and Humidity Range

Standard	IEC 60255-6:1988
Operating temperature	-25°C~+55°C
Transport and storage temperature range	-40°C~+70°C
Relative humidity	5%~95%, without condensation

Mechanical Tests

Vibration	IEC60255-21-1:1988 Class I
Shock and bump	IEC 60255-21-2:1988 Class I

Electrical Tests

Dielectric tests	IEC 60255-5:2000 Test voltage 2kV, 50Hz, 1min
Impulse voltage tests	IEC 60255-5:2000 Test voltage 5kV, unipolar impulses waveform 1.2/50μs,source energy 0.5J
Insulation resistance measurements	IEC 60255-5:2000 Isolation resistance >100MΩ, 500Vdc

MD1501-551
Trip circuit supervision relay

Trip circuit supervision relay

Trip circuit supervision function is accomplished by relay K1~K5, the typical connection is shown as dotted line part in Figure 1. An alarm will be given by relays K4 and K5 if any of following conditions happens.

- DC power supply is lost
- A fault occurs within the tripping circuit

Current operated auxiliary relay

Current operated relay can be used as a repeat relay to provide auxiliary contacts. One of the main application is to connect with tripping or closing contact of protection or control device as a current latched element. This can prevent tripping or closing contact of protection or control device from arc breaking.

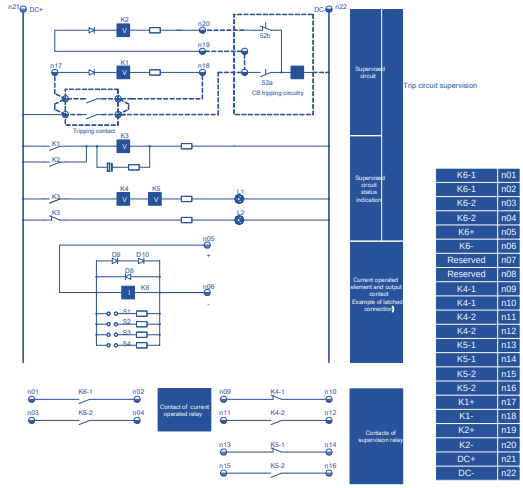

Figure 1 MD1501-551 Trip circuit supervision relay

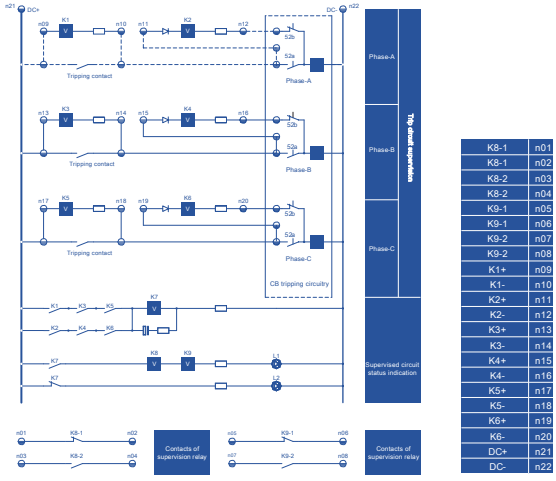

Figure 2 MD1501-552 Phase segregated trip circuit supervision relay

MD1501-552
Phase Segregated Trip Circuit Supervision Relay

Trip circuit supervision function is accomplished by relay K1~K9 (phase segregated trip circuits can be supervised simultaneously), the typical connection is shown as dotted line part in Figure 2. An alarm will be given by relays K8 and K9 if any of following conditions happens.

- DC power supply is lost
- A fault occurs within the trip circuit of any phase

Relays K1~K6 can accomplish phase segregated trip circuit supervision (2 relays for each phase, i.e. relays K1 and K2 for A phase, relays K3 and K4 for B phase and relays K5 and K6 for C phase). When phase-A of the circuit breaker is closed, relay K1 is energized and its normally open contact will make to energize relay K7. When phase-A of the circuit breaker is open, relays K1 and K2 are energized and their normally open contacts connected in parallel will make to energize relay K7.

Takes trip circuit supervision of phase-A as an example, if any of above conditions happens on phase-A circuitry, relays K1 and K2 will drop off, consequently relay K7 drops off to initiate LED indicator L2 and reset relays K8 and K9 as well, similar operation for other phases.

Alarm contacts are provided by relays K8 and K9. Relay K7 is connected in parallel with a RC circuit providing 300ms delay drop off to prevent mal-operation during transition period of tripping.

Type MD1501-556
Current Operated Auxiliary Relay

Current operated relay can be used as a repeat relay to provide auxiliary contacts. One of the main applications is to connect with tripping or closing contact of protection or control device as a current latched element. This can prevent tripping or closing contact of protection or control device from arc breaking.

Current operated relay is connected in series between an initiation contact and operating device and energized by the through current. For the application as a latched element mentioned above, its normally open contact is connected in parallel with the initiation contact (between positive terminal of DC power supply and positive terminal of current operated relay (i.e. n05, n12 or n19)). The typical application is shown as following diagram, takes relay K1 as an example, if protection device operates for an internal fault, current operated relay will be energized via the protection trip contact and its normally open contact connected in parallel with trip contact will close to latch current operated relay K1 until the current path is opened by the circuit breaker auxiliary contact.

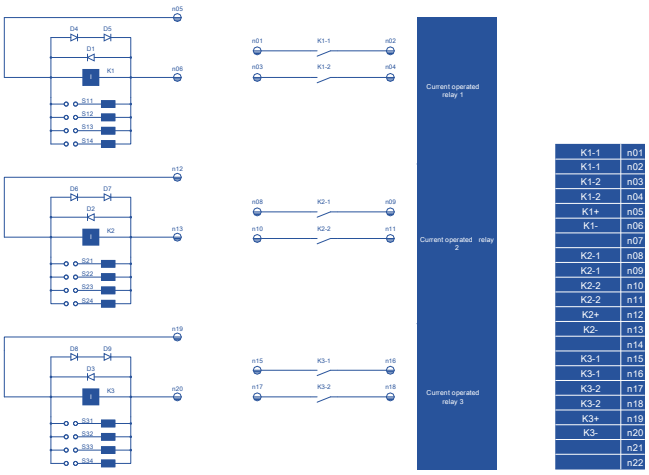

Figure 3 MD1501-556 Current operated auxiliary relay

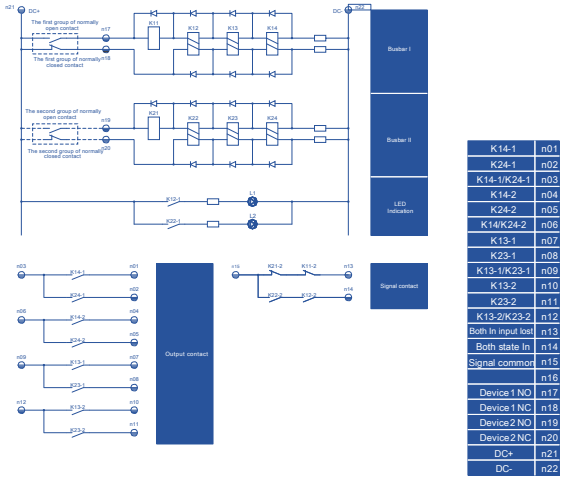

Figure 4 MD1501-561 Bi-stable switching relay

MD1501-561
Bi-Stable Switching Relay

The relay is dedicated designed for voltage switching automatically according to the state of busbar disconnector. It can also be used for various applications as a bi-stable relay or electrical reset relay for signal selection or switching control etc. subject to the requirement of applications.

Two relay groups are controlled by double-state auxiliary contacts of two devices respectively. Voltage switching of a double-busbar arrangement is taken as an example, voltage of busbar No.1 (BB1) and busbar No.2 (BB2) are connected to the relay output contacts respectively as the sources of voltage signal, the common point of output contacts is connected to a voltage detection element, both normally open and normally closed auxiliary contacts of both busbar 1 and busbar 2 disconnectors are connected to the inputs of the two relay groups (n17, n18, n19 and n20). Except relay K11 and K12, other relays are magnetic latched relays, the relay state will not change even the dc supply is lost, the output status will not be interrupted.

Alarm signal output by n13 and n16 indicates the lost of switch-in signals for both bi-stable relays. Alarm signal output by n14 and n16 indicates both bi-stable relays in ‘operated state’ that source signals are coupled. LED indicator L1 on (Green) indicates the first group bi-stable relays (K12, K13 and K14) in ‘operated state’, LED indicator L2 on (Green) indicates the second group bi-stable relays (K22, K23 and K24) in ‘operated state’.

MD1501-571
Electrical Reset Auxiliary Relay (High Burden)

Electrical reset relay requires a voltage to be applied to the element to reset the contacts. It may be used for various applications as repeat relay, control relay or signal selection etc. subject to the requirement of applications. The high burden provides greater immunity to capacitance discharge currents resulted at the inception of an earth fault on DC circuitry. This makes the relay suitable for use in distributed tripping or control circuitry where the initiating contact may be remote from the relay.

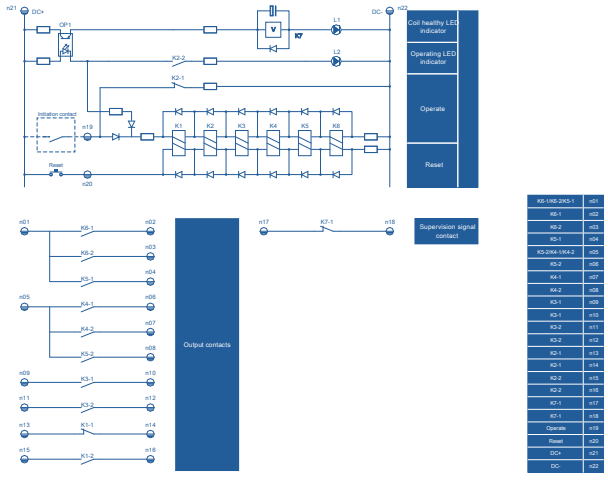

Figure 5 MD1501-571 Electrical reset relay (9 NO & 1 NC)

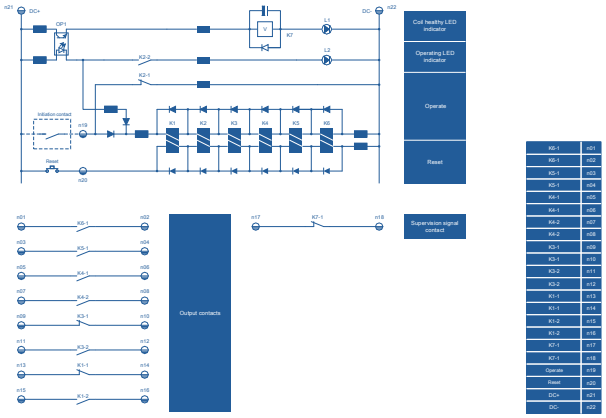

Figure 6 MD1501-571 Electrical reset relay (6 NO & 2 NC)

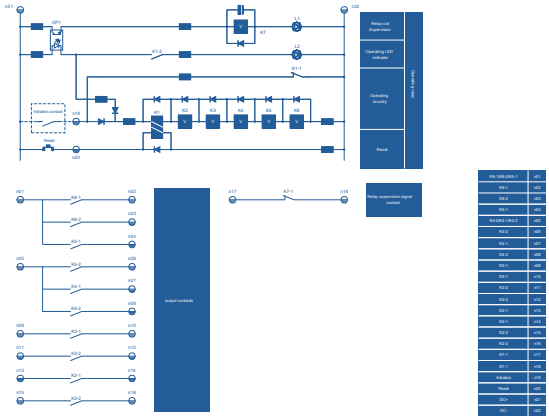

Figure 7 MD1501-572 Self reset auxiliary relay type

Relay K1~K6 are latched relays, they will maintain the position after triggered by initiation contact at terminal n19 even the initiation contact is released. The output contacts of K1~K6 can be used for tripping circuit breaker, operating secondary equipments and applied in other secondary circuits. If the relay is in operated condition, the LED indicator L2 (Red) will be lit until the relay is reset.

Relay operating coil supervision circuit is composed of opto-coupler (OP1) and relay K7, it continuously monitors relay coils and releases alarm via signal contact n17 and n18 under abnormal situations, such as coil open-circuited, loss of DC power supply etc. If the relay coil circuitry is healthy, the LED indicator L1 is lit (Green). After the relay is operated, the indicator L2 is kept via contact K2-2.

MD1501-572
Self Reset Relay with Electrical Reset LED Flag

Self reset relays reset when initiating signal is removed, making them suitable for use as trip repeat relay and general flagging purpose. The high burden provides greater immunity to capacitance discharge currents resulted at the inception of an earth fault on DC circuitry. This makes the relay suitable for use in distributed tripping or control circuitry where the initiating contact may be remote from the relay.

Relay K2~K6 are follower relays, they will be energized and reset if initiation contact at terminal n19 is closed and released respectively. The output contacts of K2~K6 can be used for tripping circuit breaker, operating secondary equipments and applied in other secondary circuits. K1 is a magnetic latched relay operated together with K2~K6 relays. If the relay is in operated condition, the LED indicator L2 (Red) will be lit by K1 normally open contact until the relay is reset. Another K1 contact, normally closed, is internally wired as cut-off contact for economizing element. After relay operation, this reduces the burden by switching out shunt resistance.

Relay operating coil supervision circuit is composed of opto-coupler (OP1) and relay K7, it continuously monitors relay coils and releases alarm via signal contact n17 and n18 under abnormal situations, such as coil open-circuited, loss of DC power supply etc. If the relay coil circuitry is healthy, the LED indicator L1 is lit (Green). After the relay is operated, the indicator L1 is kept via contact K1-2.